1965

The automated Materials Handling Support System (463L): a modern cargo system for the Military Air Transport Service

Konopik, Joseph F.; Young, Jack L.

THE AUTOMATED MATERIALS HANDLING SUPPORT SYSTEM (463L): A MODERN CARGO SYSTEM FOR THE MILITARY AIR TRANSPORT SERVICE

JOSEPH F. KONOPIK
and
JACK L. YOUNG

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by

Joseph F. Konopik

Lieutenant, Supply Corps, United States Navy

and

Jack L. Young

Lieutenant, Supply Corps, United States Navy

Submitted in partial fulfillment of
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IN
MANAGEMENT

United States Naval Postgraduate School
Monterey, California

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ABSTRACT

Air cargo transportation has assumed a major role in the defense readiness posture of the United States military service since World War II. The airlift of cargo outside the continental limits of the United States is provided by the Air Force's Military Air Transport Service (MATS) for all of the military services. MATS cargo services were recently modernized by introduction of an automated materials handling system labeled the Materials Handling Support System (463L). The evolution of this system in MATS is discussed from inception through performance evaluation, encompassing the areas of equipment identification, implementation and operational policies and procedures. The effect of the 463L System on Naval Logistics Support is evaluated by synopsizing reports and assessments emanating from Navy officials involved in transportation management and air cargo functions.

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STATEMENT OF THE PROBLEM

1. BACKGROUND AND ORGANIZATION

The tensions and conflicts created by the strained international relations which have existed since World War II have required the military services to maintain a high state of material readiness.

The degree of material readiness existing at any time can be measured, to a great extent, by the capability of the services to respond promptly with material and supplies to support operations in any number of remote areas throughout the world. The airlift of material outside the continental limits is provided by the Air Force's Military Air Transport Service (MATS) for all of the military services.

The Navy's reliance on cargo airlift to provide timely material support to overseas elements has, therefore, subjected the MATS operation to continuous scrutiny and evaluation by Naval commanders and logisticians. The preclusion of heavy contingency stockpiling in overseas areas, the high rate of equipment obsolesence, and the austere budgetary levels have served to place greater emphasis on the requirement for reliable, effective cargo airlift of Navy material.

The Air Force realizing the mounting importance of logistics airlift to all the military services has reponded by continuously attempting to improve the quality and quantity of cargo lift capability provided by MATS. In 1957, the Air Force sought to define elements of an aircraft cargo handling system which would be consistent with the larger cargo aircraft, the need for logistics pipeline reduction and the requirement

to minimize costs yet insure efficiency. This system being defined was also required to acknowledge and satisfy the need for rapid emergency reaction time and the capability for expansion. This definition led to the conception of a new Materials Handling Support System labeled the 463L System.[1]

Although the 463L System will ultimately provide cargo handling and airlift services to many Air Force elements, e.g., operational commands, Military Air Transport Service (MATS), Air Force Logisitics Command (AFLC), Strategic Air Command (SAC), etc., the scope of this paper will be limited to the use of the new system by MATS. The principal areas of the MATS 463L program to be surveyed in this paper are:

a. An introduction and discussion of the development, system hardware and terminal equipment applicable to the program.

b. Transportation management policies, procedures and methodology effected by operational implementation.

c. A synopsis of evaluations and comments regarding the effects of system implementation on naval material support.

Since this presentation of the MATS 463L program will lead to a discussion of the adequacy of this system to provide naval logistic support, it is necessary to realize that certain restrictions levied on MATS dictate, to a great extent, the quality and quantity of services rendered. MATS airlift performance is circumscribed by the number and capacity of assigned aircraft, allowable utilization rates, personnel and budgetary levels, pressures from the commercial aviation industry

[1]Partial System Package Program for Materials Handling Support System - System Number 463L. (Air Force Systems Command, United States Air Force, 1961), p. 2.

and political implications. Although, these areas are beyond the scope of this study they should be considered by the reader as factors attributing to the operational capability of the MATS transport cargo system.

2. DEFINITIONS AND ABBREVIATIONS OF TERMS

The terms used in supply and logistic operations are not familiar to everyone and are subject to varying interpretations. To clarify some of these differences and to provide a common understanding, the following definitions and abbreviations of terms are provided.

Definitions

Aerial Port of Embarkation (APOE). An airfield where heavy transports depart for channel destinations or theater locations.

Air Force Air Traffic Coordinating Office. (See Airlift Clearance Authority).

Airlift. MATS provides three basic types of cargo airlift, i.e., channel, special assignment (special mission) and attached airlift.

1. Channel Airlift. Regularly scheduled airlift service by MATS has been established between points where the volume of movement or non-availability of other forms of transport require airlift. Frequency of service is dictated by volume; however, a minimum of semi-weekly service is normally maintained.

2. Special Assignment (Special Mission) Airlift. MATS provides special assignment airlift service between points not within the established MATS route pattern or where airlift service is not otherwise available for the movement of material, generally in plane load lots. The cost of this service is approximately twice the cost of channel

airlift and is to be used when no other form of transportation will provide the necessary service.

3. Attached Airlift. Attached airlift is the airlift provided to a military oganization or command by an air transport unit of MATS and attached to that organization or command for operational control. When aircraft are designated to provide attached airlift, operational control will be as mutually agreed upon by the Air Force and the commander concerned.

Airlift Clearance Authority (ACA). The Air Traffic Coordinating Officer (ATCO), Navy Regional Air Cargo Control Office (NRACCO), Advisory Group, Air Terminal Manager, or other air traffic control and monitor activity designated by the sponsoring military service to authorize military controlled traffic for air transportation.

Airlift System. A scheduled or nonscheduled military controlled airlift operated over established routes by commercial or military air carriers.

Allocation. Apportionment by higher authority of available transportation capability to users.

Army Air Traffic Coordinating Office. (See Airlift Clearance Authority).

Astray Freight. Shipments or portions of shipments found in carriers' possession for which documentation is not available or which is being held for any reason except transfer.

Attached Airlift. (See Airlift).

Baggage (Unaccompanied). That personal property of an individual that does not move concurrently with the traveler.

Cargo. Includes all items of supplies, materials, stores, baggage, or equipment which are classified and transported as freight in contrast to those items which are classified and transported incidental to passenger movements.

Channel Airlift. (See Airlift).

Continental United States (CONUS). The 48 contiguous states and the District of Columbia.

Force/Activity Designator (FAD). A designator established by each military service or the JCS which relates to the military mission of the force or activity.

Green Sheet Request. The terminology used internally at Travis AFB, to indicate a request by a user agency to expedite certain individual shipments. This action is normally monitored by the service ATCO concerned.

Intransit Time. The elapsed time from time of entry into, until the time of exit from, the MATS system.

Manifest (Cargo). A detailed listing by type of all cargo loaded in any one conveyance.

Military Air Transport Service (MATS). The Military Air Transport Service is the Single Manager Operating Agency for Airlift Service and is responsible for providing Common User airlift service and attached airlift service with Controlled Transport Aircraft for all DOD Agencies, and as authorized, for other agencies of the U. S. Government. MATS provides airlift service:

1. between points in the U.S. and overseas areas;

2. between and within overseas areas;

3. within CONUS when necessary for reasons of security or to supple-

ment commercial air carrier service.

The airlift service operations of the agency (that portion responsible for providing airlift service) is financed under an Air Force Industrial Fund. Authorized users will pay for airlift services provided for them by MATS except as otherwise provided.

Military Standard Transportation and Movement Procedures (MILSTAMP). The uniform and standard transportation data documentation and control procedure applicable to all cargo movements in the DOD transportation System. Implementation date; October, 1963.

Military Standard Requisition and Issue Procedures (MILSTRIP). Established standard policies, procedures and instructions upon which all military services and General Services Administration (for military supply transactions) base requisitioning and issue procedures employed between customers and distribution systems furnishing items of supply. Implementation date; 1 October, 1961.

Mission Priority. Internal MATS assigned priorities for assignment and utilization of military aircraft. These priorities are as follows:

I War Plans/Emergency Support

II JCS Directed Exercises

III Airdrop/Flight Training

IV Logistic Support/Priority 1 Channel Cargo

V Logistic Support/Priority 2 Channel Cargo

VI Other Lift in Support of Prime Mission

VII Other Lift at No Expense of Prime Mission

Navy Air Traffic Coordinating Office (NATCO). (See Airlift Clearance Authority).

Navy Overseas Air Cargo Terminal (NOACT). A terminal located outside CONUS which exercises traffic management over intra-area and retrograde cargo movements.

Navy Regional Air Cargo Control Office (NRACCO). A Navy organization that conducts air terminal operations, exercises traffic management and administers airlift space available for the movement of Navy air cargo from and within assigned geographical areas.

Port Holding Time. The elapsed time from time of entry into the MATS system until the time cargo/mail is loaded on aircraft.

Priority Delivery Date (PDD). The maximum standard terminal date for normal order and shipping times required for a supply system to effect delivery of items to a requisitioner. (PDD is considered as the RDD upon assignment by the supplying/shipment activity. See also Required Delivery Date (RDD).)

Priority Designator. The numeric entry made by the initiator of a requisition which relates to the mission of the requiring activity and the urgency of need for material.

Processing Time. Time cargo is offered for offloading or time LOGAIR aircraft blocks until cargo is ready for movement.

Required Delivery Date (RDD). The specific calendar date material is required by the requisitioner or consignee.

Special Mission Airlift. (See Airlift).

Terminal-Air. An installation provided with the facilities for loading and unloading aircraft and the intransit handling of traffic (passengers, cargo and mail) which is moved by aircraft.

Traffic Management. The direction, control, and supervision of all functions incident to the effective and economical procurement and use of

freight and passenger transportation service.

Transportation Priority (TP). The Military Standard Transportation and Movement Procedures (MILSTAMP) established four Transportation Priorities, which designated precedence of movement within the DOD transportation system. The twenty Uniform Material Issue Priority Designators convert to Transportation Priorities as follows:

UMIPS	TP
1-3	1
4-8	2
9-15	3
16-20	4

Transportation Unit. A unit consisting of one or more shipment units for shipment under one transportation control number (TCN) moving on a single conveyance.

Uniform Material Issue Priority System (UMIPS). The system established by DOD Instruction 4410.6 for use by military services and Mutual Security Countries in requisitioning from designated supply activities of the DOD and the General Services Administration (GSA); in interservice supply support in peacetime and in war; to insure that requirements are processed in accordance with the mission of the requiring activity and the urgency of the need; and to establish maximum uniform requisition processing and material movement standards for use by logistic activities. The system was implemented on 1 July, 1962.

Utilization Rate. The amount of time a particular aircraft is utilized during a 24 hour period.

Abbreviations

ACA	Airlift Clearance Authority
APOE	Aerial Port of Embarkation
ATCO	Air Traffic Coordinating Officer
CONUS	Continental United States
EASTAF	Eastern Transport Air Force
FAD	Force/Activity Designator
FIFO	First-In, First-Out
JCS	Joint Chiefs of Staff
MAC	Military Airlift Command
MATS	Military Air Transport Service
MHSS	Material Handling Support System
MILSTAMP	Military Standard Transportation and Movement Procedure
MILSTRIP	Military Standard Requisition and Issue Procedure
NATCO	Navy Air Traffic Coordinating Officer
NOACT	Navy Overseas Air Cargo Terminal
NRACCO	Navy Regional Air Cargo Control Office
PACAF	Pacific Air Force
PDD	Priority Delivery Date
RDD	Required Delivery Date
TAC	Tactical Air Command
TP	Transportation Priority
UMIPS	Uniform Material Issue Priority System
WESTAF	Western Transport Air Force

3. REVIEW OF LITERATURE

Because the development of the 463L program, as a means of providing the Department of Defense (DOD) with a modern Materials Handling System, was initiated as recently as 1957, a review has been attempted of all available literature pertinent to this field of study. This review has encompassed studies and reports pertaining to the 463L program ranging from initial contractor research proposals to current system evaluations. Information has also been obtained through correspondence with individuals who have conducted prior studies in this area and through personal interviews with service representatives directly involved in the 463L development and/or implementation.

II

THE STUDY

1. METHOD OF RESEARCH

The method of research employed in this study will be primarily an analytical review of available literature, reports and correspondence relating to the development, implementation and evaluation of the MATS 463L system. Personnel working directly with the 463L program and air cargo transportation managers whose functions involve the use of this system will be interviewed to obtain additional, first hand information to supplement the historical data.

Material extracted for this paper will be arranged in a logical sequence to evolve the system from inception through performance evaluation, encompassing the areas of equipment identification, implementation, and operational policies and procedures.

2. INCEPTION OF THE 463L SYSTEM

In the years following the end of World War II stockpiling of large supplies of material in the farflung United States defense installations throughout the world was both expensive and impractical. High obsolescence rates, excessive costs and limited funds precluded a logistics readiness posture predicated on the prepositioning of stockpiled reserves. A doctrine of rapid response to supply requirements was instituted with air transportation of cargo as the tool of implementation. This concept of material readiness, based on a responsive air cargo system, greatly increased the volume of airlift moving through MATS channels and special

missions during the early 1950's.[1]

The continued development and use of electronic data processing and rapid communication transmission made it apparent that the Department of Defense and service logistics systems were advancing more rapidly than the capability to provide timely cargo airlift services to the material generated by these logistic systems. Recognizing this problem, the Air Force realized that a systems approach was needed for orderly evaluation and development of a modern cargo handling system which would effectively respond to the increasing requirements and keep pace with the technology in the other areas of logistics support. The manual aircraft loading methods and the lack of materials handling equipment compatible with the larger cargo aircraft were obvious areas that were jeopardizing cargo system capability.[2] A study described the limitations of the existing system as follows:

> The Air Force is presently using a conglomeration of non-standard items of equipment, methods and techniques in handling cargo. The present system is obsolete and inconsistent with the requirement for rapid flow of supplies to the field. Packing is excessively heavy, and each item is handled individually many times in movement from the original supplier to the user. The present system requires more personnel and heavy equipment than is necessary and consumes unnecessary resources and potential aircraft flying time. The present system of documentation is cumbersome and consumes excessive time and manpower.[3]

[1]Summary Report, Materials Handling Support System 463L, Vol. I (Santa Monica, California: Douglas Aircraft Company, Inc., Transport Aircraft Engineering, 1960), p. 1-1.

[2]LCDR. J. A. Rebentisch, Jr., USN, "MATS Role in Naval Logistics" U. S. Naval Institute Proceedings, 90:82, June, 1964.

[3]Partial System Package Program for Materials Handling Support System - System Number 463L. (Air Force Systems Command, United States Air Force, 1961), p. 104.

The Air Force, in early 1957, prepared a planning document which defined the elements of an aircraft cargo handling system requiring simultaneous development, standardization and implementation. In 1958, after determination of the practicality and feasibility of this systems approach to meet the objectives required from the modern cargo handling system, the Air Force issued a development directive establishing the Materials Handling Support System, 463L. A contract was awarded in May 1959, defining in detail a complete cargo handling system which would be compatible with all modes of transportation employed in the Air Force logistics mission.[4]

The four major objectives of the proposed system were:

a. A "unit load" concept in the movement of cargo from source to user, applying the techniques of utilization as early as practical in the logistic cycle.

b. Mechanization to the maximum extent consistent with practical design and station workload.

c. Adoption by the Department of Defense of a two priority cargo system in place of the four priority one, for the processing and air transportation of cargo.

d. Use of a single transportation document for accounting, communications, identification and control of military cargo throughout the transportation cycle.[5]

[4]Summary Report, Materials Handling Support System 463L, Vol. I (Santa Monica, California: Douglas Aircraft Company, Inc., Transport Aircraft Engineering, 1960), p. 1-2, 1-3.

[5]Col. R. Gray, USAF, "Materials Handling at Jet Speed," National Defense Transportation Journal, 20: 47-48, April, 1964.

3. SYSTEM HARDWARE AND EQUIPMENT

Although the new cargo system was defined for ultimate use by many Air Force elements, as discussed in Chapter I, the Military Air Transport Service became involved immediately and was obviously destined to become the major user of the hardware and other 463L System components. The 463L System offered the potential capability of providing the advanced technology which would enable the air cargo transportation subsystem to keep pace with the rapidly developing logistics systems operating in the Department of Defense. Necessary elements were incorporated into the initial system definition to insure complete coverage of the entire air cargo spectrum which would eventually carry a large responsibility for material readiness of United States combat and operational units throughout the world. The hardware and equipment initially proposed for the 463L System, which was ultimately to be used by MATS in providing airlift for the military services, can be classified in five major groupings:

a. Air Cargo Terminal Subsystem

b. Air Cargo Shipping Preparation Subsystem

c. Cargo Ground Handling Subsystem

d. Aircraft Loading and Internal Equipment Subsystem

e. Intransit Control Subsystem[6]

These five subsystems were designed to represent the most effective balance between: existing equipment and facilities in use and those which must be developed; the skills of personnel available to operate

[6]Summary Report, Materials Handling Support System 463L, Vol. III (Santa Monica, California: Douglas Aircraft Company, Inc., Transport Aircraft Engineering, 1961), p. 1-1.

the system, both in the Continental United States and overseas; and the worldwide environments in which the system must operate.[7] Emphasis was placed on equipment which would provide an economical and smooth flow of material in peacetime and capability for handling peak demands during a local or general emergency.

A cursory examination of hardware in these subsystems will facilitate further discussion of the 463L System.

Air Cargo Terminal Subsystem

The hardware included in the air cargo terminal may be conveniently sub-divided into three distinct categories; conveyorized equipment, automated equipment and air transportable terminal equipment.

The conveyorized equipment, which consists largely of gravity rollers, is a manually operated conveyor system. This equipment will be installed at the cargo terminals that do not carry sufficient volume to warrant automated terminal equipment. Eight main overseas MATS terminals scheduled to receive this conveyorized equipment are: Rhein Main, Germany; Chateouroux, France; Mildenhall, England; Hickham, Hawaii; Clark, Philippines; Kadena, Okinawa; Tachikawa, Japan and Elemendorf, Alaska.[8]

The automated terminal equipment includes mechanized conveyor systems capable of handling boxes weighing up to 1000 lbs. The movement, sorting and storage of cargo through these terminals will be controlled by an integrated data processing unit. This unit will enable crated parts and

[7]Partial System Package Program for Materials Handling Support System - System Number 463L. (Air Force Systems Command, United States Air Force, 1961), p. 62.

[8]Gray, op. cit., p. 48.

supplies to be sorted and weighed automatically, routed along conveyor fingers to points where they are palletized according to priority and destination, or transported to a storage point to await pickup. The electro-mechanical cargo sorter, proposed to handle items at the rate of 333 per hour, will minimize manual handling at this point of the terminal operation and allow for rapid expansion during periods of emergency or increased operations.[9] This automated equipment will be installed in the five main aerial ports in CONUS at: Dover, Delaware; McGuire, New Jersey; Charleston, South Carolina; Travis, California and McChord, Washington.[10] A schematic of the 463L automated material handling system presently installed at Travis Air Force Base is shown in Fig. 1.

The third sub-division of the air cargo terminal hardware, the air transportable terminal equipment, will provide temporary cargo terminal facilities in areas requiring these services. As the name connotes, the basic terminal module will be prepalletized for air deployment to support emergency operations. It is proposed that this unit will include truckbed height docks with gravity roller conveyors, rough terrain forklifts and trailers, gantries and hoists.

Air Cargo Shipping Preparation Subsystem

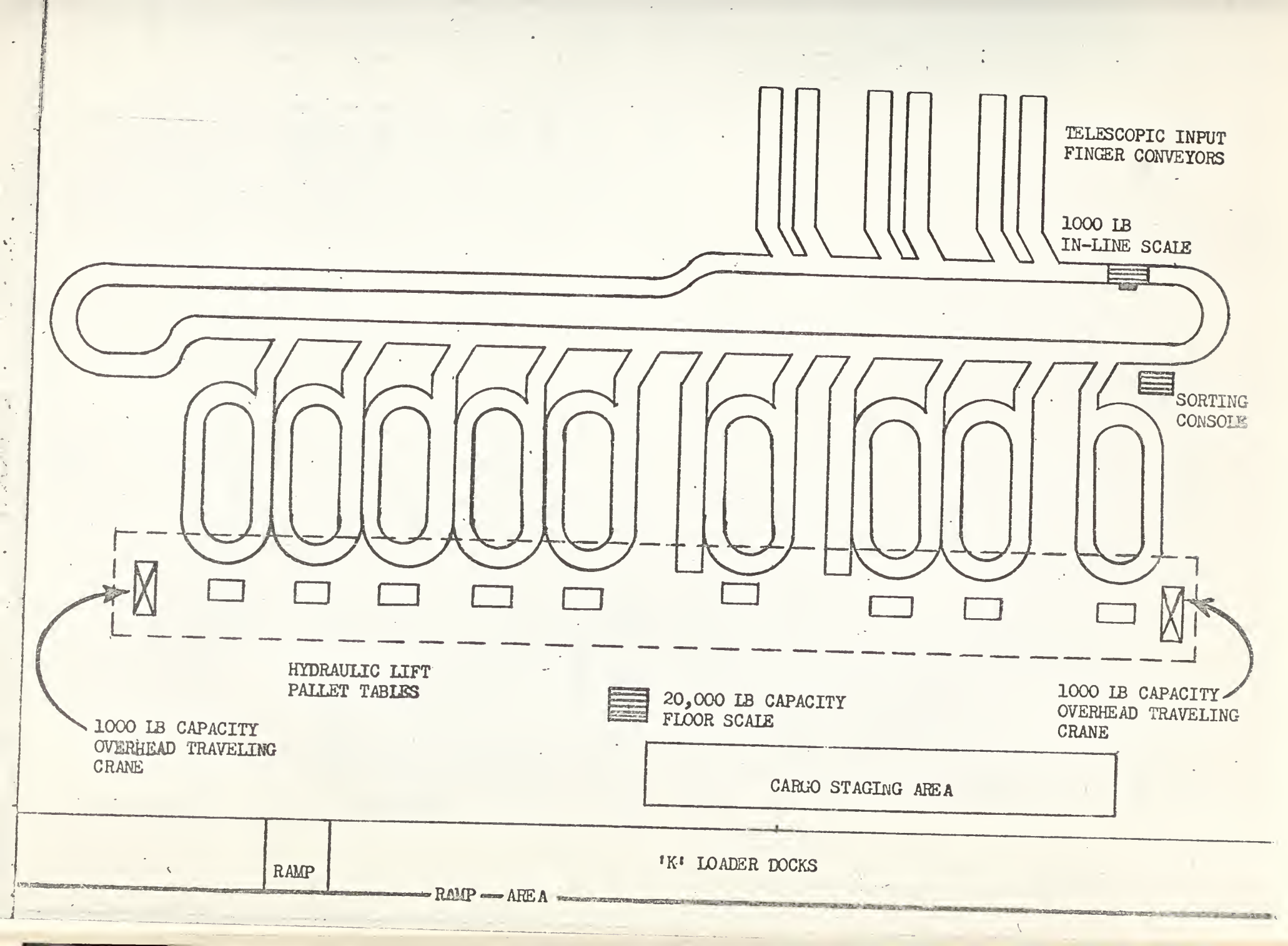
The air cargo preparation subsystem provides the 463L System with special containers required for increased efficiency, greater safety and reduced documentation. Each container developed for this subsystem will

[9]James D. Hendricks, "463L System Integrates Cargo Handling," Aviation Week, 76:61, June, 1962.

[10]Gray, loc. cit.

Figure 1

Schematic of the 463L Automated Materials Handling System, Travis AFB


TELESCOPIC INPUT
FINGER CONVEYORS
1000 LB
IN-LINE SCALE
SORTING
CONSOLE
HYDRAULIC LIFT
PALLET TABLES
20,000 LB CAPACITY
FLOOR SCALE
1000 LB CAPACITY
OVERHEAD TRAVELING
CRANE
1000 LB CAPACITY
OVERHEAD TRAVELING
CRANE
CARGO STAGING AREA
RAMP
'K' LOADER DOCKS
RAMP — AREA

optimize the cargo handling requirements by applying sound packaging, packing and consolidation principles to minimize handling and damage.

This cargo preparation group includes large master pallets measuring 88" by 108", small tactical and logistical pallets measuring 54" by 88", and associated nylon nets. The large and small pallets are of aluminum construction and have indent locking features on the edges for use with the 463L aircraft loading systems. This subsystem also includes insulated food containers, in varying dimensions compatible with the master pallets, for transporting and protecting provisions against extreme and fluctuating temperatures incurred during handling and movement. In order to save space and loading/unloading time, a consolidated container, compatible with the master pallet size, is contemplated for use in moving small items with a common destination and shipping priority.

The master pallet provides a nucleus for attaining the "unit load" concept which is one of the primary objectives of the new Materials Handling Support System. The pallet serves as a platform for stacking loose cargo, establishes the boundaries of the cargo module, provides a rigid base to maintain the shape and protect the cargo while being handled, and performs as a platform to which loose cargo may be secured. Components of this subsystem also include pallet spacers which maintain separation distances and act as a coupling device in a train loading concept.

Cargo Ground Handling Subsystem

This subsystem is concerned with the materials handling operations involving cargo movements between the air cargo terminal and the aircraft.

Extensive study, performed prior to definition of the new system, confirmed beliefs that the cargo ground handling equipment in use was outmoded and inefficient.[11] The divergence of aircraft sizes and configurations exisiting in the Air Force transport fleet made it necessary to propose various items of handling equipment and operational procedures to encompass all situations which would be encountered in MATS terminals throughout the world. Further, the equipment in this subsystem needed flexibility, ability to expand to meet emergency conditions and a potential growth factor.

Some of the major equipment items in this group are the 40,000 and 25,000 lb. capacity cargo loaders, pallet trailers, 10,000 and 6,000 lb. capacity forklifts and non-powered aircraft loading trailers, rough terrain loaders and flatbed trailer kits. The 40K loader ("K" is used to denote thousands of pounds of capacity) is a mechanized, self-propelled vehicle capable of receiving and/or discharging 20 tons of cargo. This vehicle will service low or high floor cargo aircraft and will handle five master pallets at one time. It is equipped with a conveyorized floor and operates in a 40" to 156" verticle range with a four inch side shift capability. The 25K loader possesses many characteristics similar to the 40K but does not have the side shift capability and handles only three master pallets at capacity.[12]

The pallet trailers in the ground handling subsystem are used to supplement the air cargo loaders at large terminals or as primary loading/

[11]Partial System Package Program for Materials Handling Support System - System Number 463L. (Air Force Systems Command, United States Air Force, 1961), p. 67-68.

[12]Materials Handling Support System 463L. (New York: American Machine and Foundry Company, 1961), pp. 4-5.

unloading equipment at small bases which do not justify employment of a self-propelled loader device. The trailer beds are conveyorized and depending on the size of trailer, will transport from one to three master pallets in the terminal operation.

The 10K and 6K forklifts have triple stage masts for use under and adjacent to aircraft structures. These items provide versatility in the loading operation and greatly increase the efficiency in this phase of materials handling.

The rough terrain loaders to be included in the air transportable terminal, are intended for use at remote sites and in forward areas to provide mobility over severe terrain and under adverse climatic conditions.

Aircraft Loading and Internal Equipment Subsystem

The components of this group provide the 463L System with the capability to rapidly load, off-load and secure cargo in transport aircraft. This subsystem also includes equipment installed in the aircraft or placed in the aircraft during operation to be used in conjunction with the cargo handling or securing functions.

The major components in this group include the ramp kits, winches and the aircraft cargo handling systems which have been installed in various Air Force cargo aircraft. The ramp kit is a light weight unit consisting of conveyorized folding bridges and ground-level conveyors which enable rapid discharge of palletized cargo without ground support equipment. The kit is stowed on the ramp of the C-130E Lockheed Hercules aircraft and when telescoped for use allows the cargo roll off and conveyor disconnect to be performed in approximately five minutes. A ramp kit similar in operation to the one used in the C-130E will be

included in the C-141 Lockheed Starlifter, the newest addition to the Air Force cargo fleet. The portable winches are lightweight, 6,500 pound capacity equipment which fill the requirement for efficient cargo aircraft loading of pallets, heavy vehicular equipment and outsized heavy cargo.[13]

The internal aircraft cargo handling systems included in this group have been installed in the C-133 Douglas Cargo Master, C-135 Boeing Stratolifter, C-130E aircraft and are being incorporated in the C-141 Starlifter. The internal systems differ considerably in design and purpose. The rail and roller system in the C-130E aircraft combines the air logistics and aerial delivery functions; the C-133 equipment is specifically designed for missile and cargo carrying operations; and the C-135, being a side loading aircraft, includes a transfer plate to allow movement of the palletized cargo into the side restraint rails. The internal system in the C-141 aircraft incorporates new design features which will give this aircraft needed versatility for cargo operations. The rails and rollers are permanently installed in the C-141, but when non-palletized cargo is to be loaded they may be contained in the sides and floor of the aircraft and leave smoothed surfaces for loading operation.[14] Fig. 2 depicts aircraft cargo capability and load characteristics for major Air Force and contract carrier aircraft.

Intransit Control Subsystem

The intransit control subsystem is still under active study and hardware identification is incomplete. A preliminary draft, prepared by

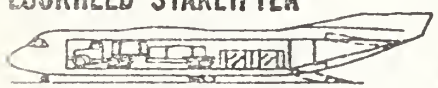
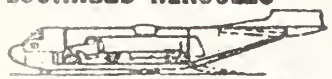
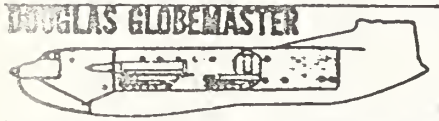
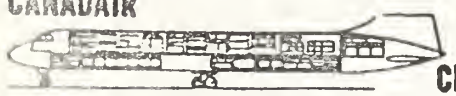
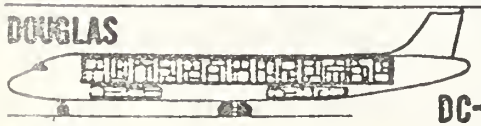
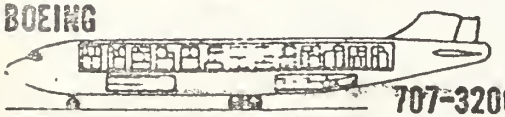
[13]Partial System Package Program for Materials Handling Support System - System Number 463L. (Air Force Systems Command, United States Air Force, 1961), pp. 63-65.

[14]Gray, op. cit., p. 62.

Figure 2

Aircraft Cargo Capacity and Load Characteristics for Major Air Force and Contract Carrier Aircraft

AIRCRAFT TRAFFIC CAPABILITY

TYPE AIRCRAFT	AVG ACL (TONS)	USEABLE CUBE-CABIN (CUBIC FEET)				PALLET CAPABILITY (NUMBER CARRIED)		FLOOR LENGTH (EXCLUDING RAMP/SLOPE)	MAIN DOOR (FEET)		REMARKS
		MAX NON-PALLETIZED	PALLETIZED MAX	PALLETIZED NORMAL	NORMAL PER PALLET	MAX	NORMAL	FEET	HEIGHT	WIDTH	
LOCKHEED STARLIFTER  C-141	35	7,357	5,484	4,590	510	10*	9	70	9	10	* 1 PALLET ON RAMP
BOEING STRATOLIFTER  C-135B	28	3,293	3,105	2,760	345	9	8	72	6.5	9.7	
DOUGLAS CARGOMASTER  C-133B	32	6,950	6,050	6,050	550	11	11	82	12.5	11.8	TOTAL CUBE, 13,000 CU/FT
LOCKHEED HERCULES  C-130E	14.4	3,060	2,900	2,550	510	6*	5	41	9	10	* 1 PALLET ON RAMP
DOUGLAS GLOBEMASTER  C-124	10.7	3,811	-	-	-	-	-	55	11.6	11.3	TOTAL CUBE, 10,000 CU/FT
CANADAIR  CL-44	28.5	5,870	3,700	3,700	370	10	10	84	6.6	10	
DOUGLAS  DC-8F	40	7,420	5,070	5,070	390	13	13	105	7.1	11.6	
BOEING  707-320C	40	8,072	5,200	5,200	400	13	13	111	7.6	11.2	

NOTES: AVERAGE ACL COMPUTED ON BASIS OF THE TRAVIS - HICKAM SEGMENT
C-141 FIGURES ARE ESTIMATES

Arthur D. Little, Inc. proposing general concepts for operation of this subsystem has recently been promulgated.[15] This report, labeling this subsystem the new Intransit Cargo Control System (INTRACONS), discusses the operation of this area for the principal control functions of documentation, clerical operations, the progressing of cargo through terminals and eventual preparation of cargo manifests. Subsystem hardware is proposed to include a control computer located at each of the major MATS bases, highspeed card reader-punches, high-speed printers and tape read-punch units. Communication lines would link the processing units at one base to similar units at other MATS installations providing rapid transmission of data between points. The report further discusses the chain of events necessary to provide all required information within the system to effectively control intransit cargo.

This preliminary draft indicates that operational use of this subsystem as proposed is contingent upon refinements to existing system areas of air cargo clearance, advance shipment notification, and other related subjects being studied in conjunction with an overall Military Standard Transportation and Movement Procedure (MILSTAMP) Improvement Program.

At the meeting of the 463L Support Phasing Group held at Orlando AFB, Florida in February 1965, group chairman, Colonel M. B. Hammond, indicated that by the end of the quarter, delivery would be complete on three-fourths of the equipment of the total program.[16]

[15]General Concepts and Operation of INTRACONS - The New Intransit Cargo Control System for MATS, Preliminary Draft, (Cambridge, Massachusetts: Arthur D. Little, Inc., 1965), pp. 1-5.

[16]"Support System (463L) Phasing Group Meeting" (Recorded Minutes of Meeting at Orlando, Florida, February 19, 1965), p. 2.

The schedule for past and future deliveries of 463L System equipment is presented in Fig. 3.

4. PRINCIPAL TRANSPORTATION MANAGEMENT POLICIES AND PROCEDURES EFFECTED BY IMPLEMENTATION OF THE MATS 463L SYSTEM

The preceeding section briefly discussed the major hardware and equipment components included in the Materials Handling Support System 463L. In addition to the changes in hardware components, implementation of the new system involved modification of some of the policies and procedures of transportation management employed in the MATS operation. A number of the principal changes in the policy and procedural aspects will be discussed in this section.

The introduction of the 463L components into the MATS operation began in early 1962 with service testing of the system elements using a MATS Western Transport Air Force (WESTAF) flight route and Pacific Air Force (PACAF) theater operations as testing territory.[17] Fig. 4 presents a geographical display of this initial testing area and identifies the activities participating in the service test. The objectives of this test, delineated in the Operational Service Test Plan for MATS, primarily concerned the evaluation of individual components of material handling equipment and their coordinated functions in related subsystems. The ultimate objective was, of course, to test the complete 463L System after all individual components were in place and evaluated.[18]

[17]Lt. Col. C. L. McDermott, USAF, "Air Force Inaugurates A New Mechanical Loading System," National Defense Transportation Journal, 18:14, July-August, 1962.

[18]MHSS 463L Operational Service Test Plan for MATS-WESTAF User Tests, Vol. II (Wright-Patterson Air Force Base, Ohio: Aeronautical Systems Division, 1962), pp. 3-4.

Figure 3

Schedule for Past and Future Deliveries

of 463L System Equipment

463L DELIVERIES

	PRIOR YEARS	CY 1964				CY 1965				CY 1966			
		1	2	3	4	1	2	3	4	1	2	3	4
PALLET & NETS (AFLC)	800						25						
C-133 SYSTEMS	47												
KIT, RAIL MOD	300												
FORKLIFT, 10K	51	24											
LOADER TRAILER	35	116											
FLATBED TRAILER KIT	31	39	29										
FORKLIFT, 6K	25	93	74										
PALLET & NET (TAC)	4435	1637		422									
TERMINAL, CONVEYORIZED					6	3							
LOADER, 40K		4	5	2		3							
WINCH			11			26	60						
LOADER, 25K			3	54	76	55							
CONTAINERS							107	123					
PALLET TRAILER	50	200	105				275	700	665				
PALLETS & NETS (108x88)	4162	1101	614	545		50	450	224					
TERMINAL, A/T		1	1					3	11				
LOADER R/T		2	1	6				9	33				
C-130 PAN SETS			12					10	50	40			
C-130 BRIDGES			10					36	170	120			
WT & BAL, C-130			2						14	94	111	111	114
TERMINAL, AUTO				1					3	1			
FORKLIFT, R/T		4							45	21			
INTRANSIT CONTROL											1		4

Figure 4

Geographical Display of Initial MHSS

463L Service Test Stations in MATS, WESTAF

MHSS 463L Service Test Stations in MATS-WESTAF

The results of the early tests on the 463L equipment were deemed highly successful by the Air Force and the equipment was retained in operational use in the test area.

Assignment of Transportation Priorities

As indicated in the opening paragraph above, the introduction of this equipment into operational use was followed by changes to existing air cargo management policies and procedures. One of the major policies in this category concerned the manner in which transportation priorities are assigned to air cargo for movement by MATS. Prior to the implementation of the 463L System, air cargo transportation priorities were assigned on a four priority basis by the shipper department or service. This service assigned priority was perpetuated by MATS and dictated the movement precedence of a particular piece of cargo in relation to other cargo being moved for that service. The four priority transportation system was established by numerous service and DOD regulations, many of which still remain in effect.[19] Nonetheless, one of the original objectives of the 463L System was the use of a two priority cargo movement system in place of the four priority classification and this objective was implemented in the form of a six month test at Travis Air Force Base, California, from September 1962 through February 1963. This two priority classification policy has remained in effect at Travis, AFB since introduction for this initial test and is rapidly permeating into other areas of the MATS system.

The purpose of the Two Priority System as enumerated by the Air Force

[19] Two Priority System Test. (Travis Air Force Base, California: Headquarters, Western Transport Air Force (MATS), 1963), pp. 1-2.

in the system test document was fourfold and based on a number of assumptions:

PURPOSES

a. Speed flow of cargo through the terminal.

b. Reduce total intransit time and improve customer service.

c. Improve terminal efficiency and economy by reducing the number of handlings and providing better utilization of space.

d. Improve MATS response to emergency situations and/or terminal overload conditions.[20]

ASSUMPTIONS

a. The 463L Materials Handling Support System now being tested at Travis AFB, strongly supports the Two Priority System of cargo handling.

b. The Two Priority System allows a straight line and more rapid flow of cargo through the terminal.

c. Two Priorities for each channel permits a more efficient use of terminal space.

d. The system reduces handlings and minimizes damage and astray cargo within the terminal.

e. The system minimizes changing of priority after the cargo is selected for airlift and reduces the burden on the machine documentation room.

f. The Two Priority System is more compatible to palletization.

g. The Two Priority System saves warehouse space which can be used for storage purposes.

h. The Two Priority System reduces processing time.[21]

[20]Ibid., p. 1.

[21]Ibid., p. 2

The changes brought about by utilizing the Two Priority System in the MATS operation have not effected initial assignment of transportation priorities (TP) by the shipper service. The Uniform Material Issue Priority System (UMIPS), established within DOD in 1962, provides 20 priority designators for assignment to material requisitioning and issue transactions. These 20 requisitioning and issue priority designators convert to four transportation priorities in accordance with a conversion schedule provided in the Military Standard Transportation and Movement Procedures (MILSTAMP). Initial service assignment of TP's for movement remains on a four priority basis. The point of departure involved in the MATS Two Priority System is that the service assigned priorities are not perpetuated during air cargo movement by MATS; rather, these four priorities are further compressed into just two TP's upon entering the MATS system for movement to destination. This conversion to two TP's is effected by categorizing service assigned transportation priority one as transportation priority one in the MATS movement system and initially assigned priorities two, three, and four, are merged as transportation priority two in the MATS Two Priority System. Fig. 5 indicates the transition of priorities from original assignment by the requiring activity to the ultimate transportation priority utilized in MATS movement. This figure also defines the overall MATS Mission Priorities and identifies the precedence accorded to logistic support in this overall mission scheme.

Service Space Allocation

The second major change in air cargo management procedures was the methodology employed in allocating air cargo space to the services

Figure 5

Transition of Priorities

FORCE ACTIVITY DESIGNATOR	URGENCY OF NEED DESIGNATOR				LOGISTICAL			OPERATIONAL
	A UNABLE TO PERFORM	B IMPAIRED CAPABILITY TO PERFORM MISSION	C OTHER THAN ROUTINE	D ROUTINE	ISSUE PRIORITY DESIGNATOR	TRANS-PORTATION PRIORITY	TERMINAL SELECTION PROCESS	MATS MISSION PRIORITIES 1. WAR PLANS/ EMERGENCY SUPPORT 2. JCS DIRECTED EXERCISES 3. AIRDROP/ FLIGHT TRAINING 4. LOGISTIC SUPT PRI-1 SAAM/CHANNEL 5. LOGISTIC SUPT PRI-2 CHANNEL 6. OTHER LIFT IN SUPPORT PRIME MISSION 7. OTHER LIFT AT NO EXPENSE PRIME MISSION
COMBAT I	1	4	11	16				
POSITIONED II	2	5	12	17	1-3	1	1	
READY III	3	6	13	18	4-8 9-15 16-20	2 3 4	2	
RESERVE SUPPORT XV	7	9	14	19				
OTHER V	8	10	15	20				

TRANSITION OF PRIORITIES

Figure 5

receiving support from MATS. This change was actually instituted in conjunction with the Two Priority System test discussed above and, like the two priority arrangement, this concept has remained in operational use since introduction for testing purposes.

A brief exposition of air cargo space allocation procedure existing prior to the 463L program will be helpful in pointing out the changes brought about by introduction of the new cargo system. Each military department submitted a monthly estimate of cargo lift requirements, by channel, to MATS, far enough in advance to permit necessary planning and scheduling functions. These preliminary estimates were subject to revision at any time and schedules were amended to reflect these changes in requirements. Based on these lift forecasts, MATS assigned space to each service on each flight. Space assignment took into consideration individual service needs as compared to total airlift required by all services. Disputes in assignment were adjudicated by the Joint Chiefs of Staff (JCS).[22]

The exodus that was made from these previously existing space allocation procedures following MATS 463L implementation was that service space allocation on a per flight basis was discontinued. This policy of terminating per flight allocation was established for compatability with operational procedures and terminal equipment employed in the 463L program. The principal factors bearing on the cessation of per flight allocation by service were:

a. Cargo was prepalletized into unit loads upon receipt at the terminal.

[22]Rebentisch, op. cit., p. 81.

b. Pallets were to be selected and shipped on a first-in-first-out basis (FIFO) within priority.

c. An automated terminal would require six conveyor lines for each channel in order to sort incoming material by services for per flight space allocation (assuming a two priority system). The automated conveyer system installed at Travis AFB, has 18 conveyor lines to service 11 channels.

One of the criterion of the test period during which per flight space allocation was discontinued was that cargo movement would be monitored on a weekly basis to insure that service allocations did not vary more than ten percent from predetermined pro-rated shares.[23]

Cargo Expediting Procedures

Another facet of air transportation management procedures subjected to considerable change is the method used to expedite particular pieces of cargo by the Air Traffic Coordinating Officers (ATCO's). Traditional expediting procedures involving personal searches of air cargo staging areas for locating and dispatching selective "hot" items or trading of space assignments between services to facilitate urgent requirements are no longer feasible or possible under the new cargo system. Prepalletization of cargo, the magnitude of the unit loads, and the discontinuance of per flight space allocation by services have all contributed to the necessity for devising alternate expediting techniques for use with the 463L System.

The expediting techniques currently being used at Travis AFB, for

[23] Two Priority System Test, Final Report, Evaluation 463L. (Travis Air Force Base, California: Navy Air Traffic Coordinating Officer, 1963), p. 2.

compatability with the 463L equipment and procedures is referred to as "green sheeting".[24] This technique provides that the ATCO's requests for expedited movement on specific MATS flights will be honored up to four hours prior to aircraft loading. Under this procedure, if the requirement for expediting a shipment is known to the service ATCO prior to the material arriving at the air terminal, receiving personnel are alerted and upon delivery of the shipment it is removed from the normal flow of cargo and is given special handling. With advance notification, expediting or "green sheeting" presents no particular problems. However, if the material to receive selective treatment has already entered the terminal operations, which is usually the case, the problems related to "green sheeting" take on new proportions. The seemingly fruitless effort involved in breaking down a complete prepalletized 10,000 pound load in order to recover and dispatch a single item for expediting has served to cause entire pallets to be up-graded in priority.

5. A SYNOPSIS OF EVALUATIONS AND COMMENTS REGARDING THE EFFECT OF SYSTEM IMPLEMENTATION ON NAVAL MATERIAL SUPPORT

The adequacy of the 463L program to meet the operational requirements of a modern military cargo system has been the subject of numerous evaluations since initial introduction over three years ago. Little, if any, disagreement exists with the overall objectives of the 463L System or the fact that the system hardware reflects engineering expertise and technological advance. The efficiency that this program provides in many facets of cargo handling and movement has surpassed the expectations of the most optimistic proponents of the system. A good example of this

[24]Two Priority System Test. (Travis Air Force Base, California: Headquarters, Western Transport Air Force (MATS), 1963), pp. 1-2.

is aircraft loading; a job in which the timeframes have been slashed from six hours to 20 minutes under 463L procedures.[25] The ability of the automated equipment to speed the flow of cargo through the terminals is further evidence of the expediency offered by this new system.

While the above factors are highly commendable and provide great contrast with the outmoded and inefficient cargo handling methods of the early 1950's, not all commentaries and evaluations of the 463L System have been favorable. Evaluatory reports submitted in response to initial testing raised questions with some of the fundamental concepts of the new system. Opponents of the system have postulated that the program is not predicated on realistic requirements of all services and that unilateral implementation by the Air Force has created serious deficiencies in MATS.[26] The major objections voiced by Navy officials revolve around the flexibility and responsiveness of the terminal operations, allocation of space, and loss of service traffic management control germane to the 463L System. Evaluations have concluded that the new system will produce a deleterious effect on Naval logistics support unless changes are made in these controversial areas.

Flexibility and Responsiveness of the Terminal Operations

The evaluation by Navy representatives of the initial 463L installation at Travis AFB expressed dissatisfaction with the lack of flexibility and responsiveness of the new operation. The final report stated:

[25]McDermott, loc. cit.

[26]LCDR. J. A. Rebentisch, Jr., USN, The Peacetime Role of MATS in Naval Logistics, (Newport, Rhode Island: Naval War College, 1963), p. 34.

> Although the time consumed at Travis AFB in initial preparation of cargo for airlift and physical loading has been lessened, the overall port holding time has increased, except for the final month of the test period (February) and this because additional airlift was applied.[27]

Another report citing statistics accumulated during the initial test period related that:

> Prior to the installation of 463L, 25 percent of all cargo was airlifted within 24 hours of its receipt. In January 1963, only three percent moved during that period.[28]

The expeditious handling of cargo through the terminal loses its favorable effect if, after processing, cargo is subjected to excessive delays for lack of airlift.

Regarding terminal flexibility, one of the subcontractors involved in the initial system study, the Arthur D. Little Company, concluded that:

> Part of the price paid for automation is loss of flexibility, and the presence of automatic sorting systems and conveyor storage systems will use up much of the available terminal space, while providing a far less efficient means for storing large quantities of cargo.[29]

It was further acknowledged, by the subcontractor, that if increases were experienced in the average backlog at MATS terminals, the storage capacity of present terminal buildings would rapidly be overloaded. The general conclusion reached by the study was:

> ...the current (463L) MATS System more nearly approaches the 'perfect' system than it does the large backlog system.[30]

[27]Two Priority System Test, Final Report, Evaluation 463L. (Travis Air Force Base, California: Navy Air Traffic Coordinating Officer, 1963), p. 4.

[28]"Trip Report." Unpublished Memorandum from Director, Land and Air Transportation and Facilities, Bureau of Supplies and Accounts, to the Chief of the Bureau. (Washington, D. C., 1962), p. 5.

[29]M. L. Ernst, "Comments on Priority Systems" (Unpublished lecture, A. D. Little Co., Cambridge, Massachusetts, 1961), p. 3.

[30]Ibid., p. 2.

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[29]M. L. Ernst, "Comments on Priority Systems" (Unpublished lecture, A. D. Little Co., Cambridge, Massachusetts, 1961), p. 3.

[30]Ibid., p. 2.

Experience with the 463L System would tend to disprove the conclusion reached by the A. D. Little study. The new MATS system operates with large backlogs. A presentation made by the Office of the Chief of Naval Operations to the Joint Staff (MTC) regarding Air Cargo Selection and Backlogs at MATS Terminals related that:

> The last six months of 1964 saw an increase in frequency and severity of backlogs at Travis AFB. Since August of last year, it has been necessary to require backlog situation reports to be submitted by the Navy Regional Air Cargo Control Office (NRACCO) Alameda as a matter of routine when predetermined levels of backlog are exceeded.[31]

This presentation included the recommendation that because of the serious delays encountered in cargo movement, backlog data should be reported routinely to the JCS. It was further recommended that some backlog "peril point" be agreed upon which would automatically activate the Joint Transportation Allocation Board.

In January 1965, a study was conducted by Commander Service Force, Pacific Fleet to determine the impact on fleet readiness of MATS backlogs which were causing excessive delays in material deliveries.[32] The results of this study, indicating the number of days specific transactions were delayed at Travis AFB due to backlog conditions and the resulting effect of fleet readiness, are included as Appendix I of this report.

LT. COL. M. W. Staudenmayer, USAF, who conducted a study of cargo backlog at Travis AFB during the period 13-22 March 1965, concluded in

[31] Air Cargo Selection and Backlogs at MATS Terminals. (A presentation by the Office of the Chief of Naval Operations to the Joint Staff (MTC), 1965), p. 4.

[32] Study on the Impact of Recent MATS Backlogs on SEVENTH Fleet Readiness (Analysis conducted by Commander Service Force, U. S. Pacific Fleet, January, 1965).

his report that:

> The present receipt system takes as long as 20-24 hours to receipt for cargo, this, with the peaks and valleys in the workload, makes it almost impossible to hold an optimum backlog...[33]

The above studies support the position maintained by Navy officials regarding inflexibility of the terminal operations and lack of system response under 463L procedures and openly conflicts with a recent statement that:

> At Travis, with the introduction of the first loaders and mechanized conveyor system, terminal flexibility has been greatly improved and workload surges are easily handled.[34]

Allocation of Space

The policy of airlift space allocation under 463L procedures is a second area of concern and objection in Navy evaluatory reports. As indicated in an earlier section of the study, 463L implementation by MATS was followed by discontinuance of the JCS-approved regulations providing for cargo space allocation, by service, on a per flight basis.

Navy opposition to space allocation policies used with the 463L System centers around short run rather than long run considerations. The Navy ATCO at Travis AFB commented recently that individual service space allocations are fairly consistent with assigned quotas when these figures are computed on a monthly basis. However, daily or weekly allocation received often varies considerably from prorata service shares causing fluctuations in intransit times, difficulty in expediting, and

[33]LT. COL. M. W. Staudenmayer, USAF, "Backlog of Air Cargo at Travis Air Force Base" (An unpublished TDY Report, March, 1965), p. 3.

[34]Gray, loc. cit.

inaccuracies in delivery projections.[35] Further, it is contended that the short run inequities in allocation jeopardize the ATCO's capability to effectively accomplish transportation management functions.

Traffic Management Control

After Navy material has been approved for air movement by the appropriate NRACCO, the service transportation management and expediting functions rest with the Navy ATCO at the aerial ports. The ability of the Navy ATCO's to perform necessary air cargo management functions under 463L procedures is another issue contested by Navy assessments of the new cargo system.

The Two Priority System introduced by MATS for use with the 463L program is the primary target for attack in most Navy evaluations. In discussing problem areas in Naval logistics incurred as a result of 463L implementation, LCDR J. A. Rebentisch, Jr. commented that:

> At least four gradations of urgency (priorities) are needed to allow the ATCO's to make sound traffic managment decisions.[36]

A recent article by LCDR J. D. Kohl, a Navy ATCO who has operated with the 463L program, relates that MILSTAMP procedures, implemented throughout the Department of Defense, conflict with the MATS Two Priority System in one very important area.[37] MILSTAMP provides for the use of a Required Delivery Date (RDD), which dictates the maximum standard terminal date for normal order and shipping times, on all transportation documents.

[35]Statement by LCDR. A. G. Moe, USN, Navy Air Traffic Coordinating Officer, Travis Air Force Base. Personal Interview, June 1965.

[36]LCDR. J. A. Rebentisch, Jr., USN, The Peacetime Role of MATS in Naval Logistics, (Newport, Rhode Island: Naval War College, 1963), p. 29.

[37]LCDR. J. D. Kohl, USN, "Recent Developments Affecting Cargo Movements via MATS" (An unpublished Report by the Navy Air Traffic Coordinating Officer, Tachikawa, Japan, August, 1964), p. 3.

This RDD is assigned by the requisitioner or computed using guidelines established in MILSTRIP and UMIPS. Kohl states that the RDD system deliniated in MILSTAMP:

> ...for the first time, provides the military traffic manager with positive and credible guidance for determining sequential movement of cargo within transportation priority classification.[38]

He concludes in his article, however, that this RDD provision in MILSTAMP is completely disregarded in the MATS desired Two Priority System. Cargo movement accomplished on a first-in first-out basis by two transportation priorities makes no allowance for this management tool provided by MILSTAMP.

Another area of concern to the Navy, regarding traffic management control under 463L procedures, is the severe limitations that the program places on the ATCO's ability to expedite specific shipments. The prepalletization of cargo into huge 10,000 lb. loads makes location and isolation of a specific transaction a herendous task once material has entered the automated system. In his article on the MATS Role in Naval Logisitics, LCDR Rebentisch indicates that:

> The reluctance of terminal personnel to break down a 10,000 lb. unit load to remove a shipment, at the request of an ATCO, is readily understandable. Yet the loss of this capability on the part of the ATCO would make his presence at the aerial port superfluous.[39]

The only alternative method of expediting material proposed in 463L procedures is the "green sheeting" technique discussed earlier, which normally requires giving precedence to the entire 10,000 lb. load containing the item to be expedited.

[38] Ibid.

[39] LCDR. J. A. Rebentisch, Jr., USN, "MATS Role in Naval Logistics" U.S. Naval Institute Proceedings, 90:82, June, 1964, p. 85.

III

SUMMARY AND CONCLUSIONS

This study has discussed the inception and evolution of the 463L program and the modification to MATS policies and procedures which have resulted from system implementation. The ability of this new MATS program to adequately provide airlift in support of Naval Logistics has been analyzed by drawing together evaluatory reports prepared by Navy transportation managers, traffic specialists and operating elements. The general conclusions reached in these reports are that the hardware and overall objectives of the system have been enthusiastically received, but that a number of operating policies and procedures severely limit the effectiveness and expediency of MATS service. The majority of these appraisals made by Navy officials voice the opinion that continuation of these policies that have been criticized since initial introduction of the 463L System will have a deleterious effect on Naval Logistic Support.

It is not the purpose of this paper to prove or disprove the effectiveness or weakness of the MATS implemented 463L System. Rather, it is an attempt to provide background on the development and operation of the system and to furnish a synopsis of Navy evaluatory comments regarding its support characteristics.

In conclusion, general observations are presented which are pertinent to the controversial areas posed in Navy evaluations:

- The advent of mechanization and automation has required a sacrifice of personal handling and selective treatment previously afforded under manual cargo movement procedures. The desired goals of the 463L program

are not in question. The requirement for a faster, more efficient system, which will handle a greater volume of cargo and allow for rapid expansion in emergencies, is a necessity. Formulating the balance in the trade-off between mechanization and personal control is one of the problems requiring an answer.

Given adequate airlift, ample to move all material on the next available lift, the controversial areas regarding any cargo system cease to exist. The probability of cargo airlift increasing to these heroic proportions is, needless to say, extremely remote. Moderate capacity increases, however, have been predicted in the near future. The introduction of the C-141 Starlifter in May 1965, and the development of the C-5A heavy logistics transport, scheduled to be operational in 1970, purportedly hold the key to Secretary of Defense McNamara's proposed five-fold increase in airlift capability over that available in 1961.[1]

The Commander, Western Air Force, Travis AFB, recently stated that airlift capacity is increasing and will continue to increase. He indicated that this increase will stem from modernization programs during the next five years and improved management of resources on hand. He concluded his remarks with these comments on the C-5A cargo aircraft,

> If I may venture a prophesy, here is the breakthrough in air transportation for which we have been waiting.[2]

Whether these new programs will actually result in the significant capacity increases that are predicted or actually do little more than replace planes becoming obsolete is a question to be answered by the future.

[1]"How New Hardware Will Resolve Prompt Airlift/Sealift Dilemma," Armed Forces Management, 11:132, March 1965.

[2]MAJ. General G. G. Dany, USAF, (Panel presentation, National Defense Transportation Day, San Francisco, California, May 1965).

Another possible source of additional lift capacity lies in the recommendation to increase the present MATS aircraft utilization rate of five hours.[3] The unsuccessful attempt to increase the utilization rate to ten hours at the outbreak of the Korean War further justifies this recommenation in light of the current global hostilities.

- Concern over the excessive backlogs and dissatisfaction with the space allocation and transportation management aspects of the 463L System are aggrevated by improper application of Uniform Material Issue Priority System (UMIPS). This results from unjustified use of high priority designators on material requisition and issue transactions. The misuse of UMIPS has caused the generation of a high volume of issue priority group one and two shipments. Introduction of these shipments into already overloaded MATS channels has necessitated arbitrary decisions in the allocation of transportation resources. The military services, Joint Chiefs of Staff, Defense Supply Agency, and General Services Administration are presently engaged in a comprehensive study of UMIPS, directed by the Assistant Secretary of Defense (I&L). These studies are to be coupled with in-house reviews of guidance furnished to field activities for the derivation and control of issue priorities.[4]

Inequities in priority assignment, coupled with the 463L Two Priority System have led to competition existing in lift precedence between such items as primary system repair parts and unaccompanied personal baggage.[5]

[3]LCDR. J.A. Rebentisch, Jr., USN, The Peacetime Role of MATS in Naval Logistics, (Newport, Rhode Island: Naval War College, 1963), p. 33.

[4]Policy Council Notes. Report No. 9 (Washington, D. C.: Navy Department, Bureau of Supplies and Accounts, May, 1965), p. 2.

[5]Two Priority System Test, Final Report, Evaluation 463L. (Travis Air Force Base, California: Navy Air Traffic Coordinating Officer, 1963), p. 7.

Although possible results of this present UMIPS study may provide remedial action to insure stricter control and adherence to UMIPS regulations, the underlying controversy regarding backlog, space allocation and management principles will remain. At best, this study of service use of UMIPS may alleviate the degree of dissatisfaction in these areas.

• Another consideration of possible future action in this area lies in recommendations to remove MATS from Air Force control. In July 1962, Congressman Rivers introduced legislation to redesignate MATS as the Military Airlift Command (MAC), and to transfer control to JCS as a specified command.[6] This proposal would, in effect, divorce procurement decisions and budgetary requirements of MATS from Air Force control, and thus eliminate competition of MATS programs with others in the Air Force which are higher priority than transport. Rivers' legislation regarding a MAC was put aside by the committee. However, as airlift resources increase, resulting from C-141 deliveries and contract progress on the C-5A, there is certain to be more discussion at the Pentagon and on Capitol Hill regarding concentration of airlift resources into a Military Airlift Command.[7] Questioned about the possibility of a MAC, MATS Commander, General Estes says only that this is a matter to be decided ultimately by the Secretary of Defense and the President, upon advice of the JCS.[8]

[6]"Representative Rivers Seeks New Airlift Answers," Army Navy Air Force Journal and Register, July 1962, p. 14.

[7]"New Air Transport Era Ahead; MATS Set for Major Changes," The Journal of the Armed Forces, 102:17, March 1965.

[8]Ibid.

A related subject in this area is the possibility of increasing the precedence accorded to cargo lift within the overall MATS Mission Priorities. These mission priorities, identified and defined in Fig. 5, indicate that transportation priority one material is presently assigned MATS "Mission" precedence four, which is subordinate to exercise requirements. Studies now underway within the Joint Staff are attempting to resolve this seemingly inequitable mission assignment.[9]

• An interesting observation regarding MATS 463L policies is that under emergency conditions palletized operations will cease. Cargo will be built up on skids, by service, by channel, and priority. According to Air Force regulation, these emergency procedures are necessary:

> To ensure an equitable distribution of cargo by service, by channel, and priority for each mission.[10]

Presumably, these measures are required because heavy cargo generations during emergencies would greatly exceed airlift capacity.

The discussion of cargo backlogs in this study and the fact that heavy backlogs are still being experienced at this time[11] indicates, however, that insufficient airlift capacity is not solely a function of emergency conditions. Thus, perhaps the Air Force regulations dictating a system change during emergency operations to, "Ensure an equitable distribution of cargo", lends support to Navy evaluations which have opposed the current policies on space allocation and transportation

[9]Air Cargo Selection and Backlogs at MATS Terminals (a presentation by the Office of the Chief of Naval Operations to the Joint Staff (MTC), 1965), p. 2.

[10]Military Airlift Terminal Procedures, 1501st Squadron No. 76-37 (Travis Air Force Base, California, June 1963).

[11]Statement by LCDR. A. G. Moe, USN, Navy Air Traffic Coordinating Officer, Travis Air Force Base, California. Personal Interview, June 1965.

priorities. Commenting on this area in 1963, the Navy ATCO at Travis asserted that:

> The procedures necessary under emergency conditions should be identical, or as nearly so as possible, to those under normal operations.[12]

Even considering areas of controversy created by MATS implementation of the 463L System, the great strides forward in the air cargo operations evidenced during the last decade are manifest. The existence of differing opinions and diverse expectations are not necessarily indications of inter-service frictions. Rather, they are evidence of a conscientious regard for the increasing significance and paramount importance of air cargo movement in discharging logistic responsibilities. Only through the continuing interest and personal concern of individuals who work for an optimal system can ultimate success in this field be achieved. Rapid air transportation from source to user is the vital link in our current defense network - - every effort must be directed toward attaining its greatest possible efficiency.

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Appendix I

Examples of Delayed MATS Shipments and Their Effect on Readiness of Seventh Fleet Aircraft Squadrons and WESTPAC Activities

EXAMPLES OF DELAYED MATS SHIPMENTS AND THEIR EFFECT ON READINESS OF SEVENTH FLEET AIRCRAFT SQUADRONS AND WESTPAC ACTIVITIES

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
NSD Yokosuka	Work stoppage on SP-2E aircraft	SP-2E A/C	5
	Work stoppage on TF-9J aircraft	TF-9J A/C	3
	Work stoppage on RF-8A aircraft	RF-8A A/C	4
	Work stoppage on F8C aircraft	F8C A/C	3
	Work stoppage on F8C aircraft	F8C A/C	3
	Work stoppage on UH34D aircraft	UH34D A/C	5
SRF Yokosuka	Material received after ship had left. Temporary repairs to essential equipment.	B. H. RICHARD (CVA31)	5
	Material not received in time to make repairs to essential equipment.	RANGER (CVA61)	5
	Material not received in time to make repairs. Job cancelled.	RANGER (CVA61)	3
SRF Subic	Material had to be delivered from another job. Boiler repairs.	GRIDLEY (DLG21)	7
Pearl Harbor Naval Shipyard	Ship deployed without one gun mount operating.	Gun sight	5
	Did not arrive in time to install	Antenna anchors	6
	Work stoppage.	FBM connectors	3
	Delayed sailing.	LANSING Loran	4
	Disrupted work schedule.	Radar X mitter room CARPENTER	3
	Disrupted work schedule.	Tubing for special project SS338	6

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
Pearl Harbor Naval Shipyard	Disrupted work schedule.	Tubing for special project SS338	8
	Disrupted work schedule.	Gyro unit CARPENTER	4
	Disrupted work schedule.	Deck house insulation EPPERSON	3
	Disrupted work schedule.	Primer CARPENTER	3
	Disrupted work schedule.	Wire rope for safety nets	3
	Disrupted work schedule.	Chain USAEC project	3
	Disrupted work schedule.	Machine bolts USAEC project	3
	Disrupted work schedule.	Fire main mod. oper gear EPPERSON	3
	Disrupted work schedule.	O. B. Bearings CARPENTER	3
	Disrupted work schedule.	Modified hull liners SS BONEFISH	3
	Disrupted work schedule.	Main Hyd System Polaris	3
	Disrupted work schedule.	Tubing for special project SS337	3
	Disrupted work schedule.	ME Blowers MEDREGAL	5
	Disrupted work schedule.	Air supply system project SHAD	5
NAF Naha	Impaired capability.	P34	4
	Impaired capability.	Landing gear outer door SNB5	4
	Unable to perform	P-73 Nose assy-MK43-1	3
	Unable to perform	Oscillator SP2H	3
	Unable to perform	ANUPM-109 Calibrator	4
	Unable to perform	AN/AQA-3A	3
	Unable to perform	Allignment fixture P3A Critical list	8
	Unable to perform	HIVAC/AN/ARC-52	6

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
NAS Agana	Delay in testing torpedoes.	Torpedo testing bench	4
	Delay in completion of commitment.	Used in processing aerial color film	4
MCAS Kaneohe	AOCP	C54Q	4
	AOCP	A4C aircraft	3
	AOCP	TF9J A/C	3
	ANFE	UH34DA/C	4
	Work stoppage	J87 engine	3
FLEACTS Sasebo	Had to cannibalize from another ship - part did not arrive in time	VIREO MSC205	4
	Old part repaired work was marginal. Part arrived after ship sailed.	WEISS (APD135)	3
	Old part repaired..work was marginal. Part arrived after ship sailed.	WEISS (APD135) 1 & 2 main cir pump	3
NAVSTA Sangley Pt.	ANFE	SP-5B aircraft	4
	ANFE	SP-5B aircraft	6
	Work stoppage	SP-5B aircraft	3
	AOCP	SAR aircraft/UH2B	3
	AOCP	SAR aircraft/UH2B	3
Submarine Training Facility, Pearl Harbor	Testing delayed 1 day	FBM Navigation System	3
	Training delayed 1 week	Fire control sub-system	3
MSTS Far East	Item had to be fabricated due to late receipt	Cargo piping in tanks	3
	Item had to be fabricated due to late receipt	Cargo piping in tanks	4

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
HSA Saigon	Adverse effect on people in the field	M-2 carbines	3
	Passenger seats -- could not haul passengers	UC45J A/C	3
PWC Subic	No liquid oxygen/nitrogen generator	Oxygen/Nitrogen Generator	3
	No liquid oxygen/nitrogen generator	Oxygen/Nitrogen Generator	4
	No liquid oxygen/nitrogen generator	Oxygen/Nitrogen Generator	5
	No liquid oxygen/nitrogen generator	Oxygen/Nitrogen Generator	4
MCAS Iwakuni	AOCP	SP5B	3
	Virus vaccine to prevent an epidemic	Children	3
VMCJ1	AOCP	EF10B	9
	AOCP	EF10B	4
MARAERIAL FLTRANSRON 152	AOCP	KC130F	4
	AOCP	KC130F	6
	Could not perform primary mission	KC130F	5
	Could not perform primary mission	KC130F	3
	Could not perform primary mission	KC130F Hyd system	5
	Could not perform primary mission	KC130F	5
VR21	AOCP	Engine, AOCP 29 days	3
	Required substitute item	Jet Pod.	3

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
VF53	AOCP	F8E	14
VMFAW	Impaired readiness capability	F8E	6
Marine Air Base Squadron	Could not provide required support	Liquid oxygen generator plant	4
	Could not provide required support	Liquid oxygen generator plant	3

EXAMPLE OF DELAYED MATS SHIPMENTS AND THEIR EFFECT ON READINESS OF SEVENTH FLEET SHIPS

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
USS B. H. RICHARD	Aircraft not fully equipped	Angle of attack system	3
	AOCP	Aft rudder trim & Domper assy	3
	Aircraft not fully equipped	Auto Flight control sys aft	3
	Aircraft not fully equipped	Computer set, Dead reckoning	3
	AOCP	All attitude Indicator sys	3
	Aircraft not fully equipped	Radar Set (AN/APQ-94,94 TI)	4
	AOCP	All attitude indicator sys	5
	Aircraft not fully equipped	Missile sys, wing mounted	3
	Aircraft not fully equipped	Missile sys, wing mounted	3
	AOCP	Fwd fuel cell installation	3
	AOCP	All indicating sys	3
USS KEARSARGE	AOCP	S2F stabilizer	4
	AOCP	S2F stabilizer	4
	AOCP	S2F fuel sys	4
	Aircraft not fully equipped	SH3A Rescue	3
	Aircraft not fully equipped	Waveguide switch EA-1E	3
	AOCP	SH-3A Gear box	3
	AOCP	S-2F Fwd fuselage glass assy	3
	AOCP	S-2F Windshield	3
	AOCP	S-2F fuselage Alum skin	4
	AOCP	SH-3A Tail Rotor	3
	AOCP	SH-3A Tail Rotor	3
	Aircraft not fully equipped	SH-3A	4
	AOCP	S-2F Wing	3
	Aircraft not fully equipped	SH-3A Sonar Cable	3

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
USS RANGER	Reduced capability of radar	AN/SPG-48 Radar	4
	Unable to produce required rapid prints in photo lab	Photo lab	3
	Delayed msg preparation	Master Fax in Communication	9
	AOCP	J79 Engine F4B	5
	AOCP	A4C J65 Engine	3
	ANFE	Emergency cable cutter on UH2A	3
	AOCP	MLGA4C Unit assy	5
	ANFE	Armament F4B - Bomb rack	5
	ANFE	A1H Aircraft service chg.	3
	AOCP	A3B Cockpit pressure & cooling system	11
	AOCP	F4B Transducer	3
	ANFE	In flight refueling system A3B	9
	ANFE	Plug	6
	AOCP	F4B engine access door	9
	AOCP	Comp of AJB F4B gyro	11
	AOCP	F4B Door assy	5
	AOCP	Indicator for F4B	4
USS CONSTELLATION	A1H grounded for part	A1H aircraft Cly OXG	4
	F4B grounded for part	F4B Strut	3
	F4B grounded for part	F4B strut	3
	F4B grounded for part	F4B door, landing gear	3
	F4B grounded for part	RM 1560 783 7229 BF1A	3
	F4B grounded for part	Nut	5
	F4B grounded for part	Duct	3
	F4B to perform primary mission	Speed Drive	7
	F4B grounded for part	Strut	3
	A1H unable to perform primary mission	Loop assy	3
	A4C unable to perform primary mission	Sensor	3

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
USS CONSTELLATION	F4B unable to perform primary mission	Launcher	5
	F4B unable to perform primary mission	Centerline	4
	A3B unable to perform primary mission	Rack	3
	F4B grounded for part	Strut assy	4
	F4B grounded for part	Gyro	31
	A4C grounded for part	Gyro	5
	F4B grounded for part	Door assy	4
	A4C grounded for part	Door assy	4
	A4C grounded for part	Gyro	4
	A3B unable to perform primary mission	Oscillator	3
	Impaired capability in all F4B	F-4 holdbabk	10
	Impaired maint capability of F4B	F-4 afterburner	10
	Impaired maint capability of all jets	Regulator	3
	A4C grounded for part	Hook assy	4
USS WINDHAM CTY	Reduced readiness significantly	Lube oil purifier	4
USS ELDORADO	Unable to provide TACAN to aircraft	AN/URN-3A TACAN	3
USS COONTZ	Reduced homing missile guidance 50%	AN/SPG-55A Radar	3
USS TURNER JOY	Reduced gun fire Control 50%	MK68GFCS	3
USS COLUMBUS	Equipment CASREPT reduced readiness	AN/SPW-2B	4
	Readiness reduced Tartar sys	Tartar handling equip	7
	Equip impaired reduced readiness	AN/SPG-51B	4
USS OKLAHOMA CITY	Delayed CASCOR boilers	Boilers #4 and #1	3
	Delayed CASCOR height-find Radar	AN/SPS-42	4
USS RAINIER	CASREP reduced readiness	Blower Aux boiler	4
USS GOLDSBOROUGH	Effectiveness reduced due lack of radar	AN/SPS-39 Radar	4

ACTIVITY	EFFECTS ON READINESS	SHIP/EQUIPMENT	DAYS HELD AT TRAVIS
USS BAUSELL	Impaired DC readiness personnel safety equipment HF communications reduced	Damage Control equip	4
	CASREP	AN/URC-32	4
USS PARSONS	Reduced Operational capability	Diesel engine (complete)	6
USS RUPERTUS	ASW Capability substantially reduced	QH-50-C	5
USS ELDRADO	Unable to provide TACAN to aircraft	AN/URN-3A TACAN	4

LIST OF RESPONDENTS

NAME	TITLE/ACTIVITY
Clarke, LCDR. J. L., USN.	463L Project Officer WESTAF Travis AFB, California
Dolezal, MAJ. C., USAF.	463L Project Officer MATS, Headquarters Scott AFB, Illinois
Killion, CDR. C. D., USN.	Officer in Charge NRACCO NAS, Alameda, California
Kohl, LCDR. J. D., USN.	NOACT Tachikawa AFB, Japan
Larson, CDR. P., USN.	Assistant Officer in Charge Navy Transportation Management School Oakland, California
Lind, L. F.	Senior Civilian Land and Air Branch Transportation Division Bureau of Supplies and Accounts Washington, D. C.
Moe, LCDR. A. G., USN.	Assistant Navy ATCO Travis AFB, California
Mundy, FLT/LT. D. A., RCAF.	Assistant 463L Project Officer MATS, Headquarters Scott AFB, Illinois
Smith, CDR. C., USN.	Officer in Charge NRACCO Naval Station Norfolk, Virginia
Templeton, 1st/LT. P. A., USA.	Army ATCO Travis AFB, California
Vroman, LCDR. W., USN.	Navy ATCO Travis AFB, California